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ORGANIC MATTER REBUILT IN PURE SAND

(A Report of Laboratory Experiments)

EHRENFRIED PFEIFFER

At the UN conference on the conservation of natural resources, in September 1949, it was stated that soils which have been completely run down cannot be rebuilt to fertility. We were intrigued by this rather 'fatalistic' statement, and wanted to find out whether it was intended to express an absolute fact or a relative condition. Did the speaker refer to prohibitive costs, and the effectiveness of known measures of soil conservation, or did he mean that there is no hope whatsoever? A further stimulus to our interest was the common knowledge that desert soils sometimes contain all the minerals which are needed as plant foods and it is only the absence of water and organic matter which makes these soils 'infertile'. So we decided to use pure, sterile sea sand and put it to test in a laboratory arrangement permitting control of all factors in a completely closed and observable system.

The sand was prepared in the following way. The cleanest looking, white sand was boiled for several days with hydrochloric acid, decanting and renewing the acid from time to time, until nothing further went into solution. Then the sand was washed repeatedly with distilled water to remove the acid. This was continued until the only mineral contents remaining in the water were traces of magnesia and phosphates which were contained in the silica compound of the sand. Then the sand was brought to red heat and held there for four hours, after which it was filled into glass tubes one inch in diameter and ten inches in length. The columns of sand were held in position with glass wool. Each tube was connected at the bottom with a collecting bulb; and this, in turn, was connected, by a long tube, to the upper end of the test tube on the one side, and to a light suction pump on the other. The upper end of each sand column tube was also connected with the same suction system so as to equalize pressure or suction. Sampling tubes were integral parts of the system so that samples of the solutions could be taken without disturbing it. This apparatus is a somewhat modified arrangement of the one suggested by Professor J. H. Quastel of McGill University for the study of the biochemistry of soil systems and micro-organisms.

Distilled water only was used throughout the entire experiment. At first, for about three to four weeks, the water was drawn up from the collecting bulbs to the tops of the test tubes and dropped down on the sand, penetrating it and being collected again in the bulbs underneath. Then this solution, which extracted the sand, was recirculated. We call this the percolation phase. Only just enough was percolated each day to keep the sand moist, but not drenched in water. During this phase, therefore, the extracted solutions were added again to the sand and a kind of equilibrium was maintained. After three to four weeks the percolation phase was completed and the second phase, the extraction to zero contents phase began. During this phase, after the percolation solutions had been removed, pure, distilled water was added to the system and drawn away. This operation was repeated until the water in the bulbs no longer showed a content of any kind, i. e. nothing more could be extracted. For the percolation phase 150 cubic centimeters of water were used; for the extraction to zero, in general, 170 to 350 cubic centimeters were needed. All solutions were analyzed, the water-soluble humus was determined spectrographically; sand and additions were analyzed before the experiment, and the sand with admixtures again after the experiment was completed.

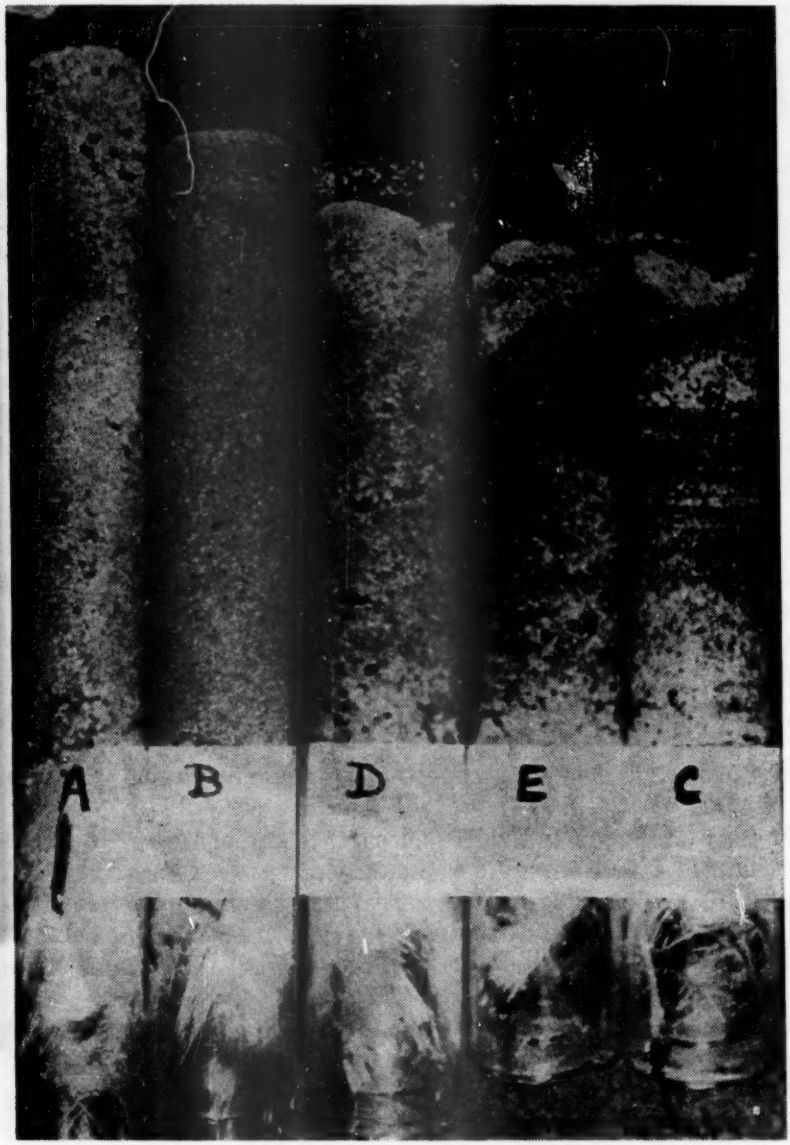
This paper concerns only the building up of humus in sand. The other fiindings will be reported at some later time in connection with soil extracting experiments. The following fillings were used in the test (extraction) tubes:

A. Pure sand alone.
B. Pure sand plus 0.01gm. of a mineral fertilizer, 6-10-4.
C. Pure sand plus 1gm. biodynamically treated, well-rotted, earthy compost.
D. Pure sand plus 0.1gm. of the bio-dynamic preparation No. 500.
E. Pure sand plus 1gm. of equal parts of the bio-dynamic preparations Nos. 502 to 506 (mixed) and two drops of No. 507.
F. Pure sand plus 2gm. of equal parts of the bio-dynamic preparations Nos. 502 to 506 (mixed) and three drops of No. 507.
G. Pure sand plus 1gm of the bio-dynamic preparations as in E plus 0.1gm. of No. 500.

(In all cases 50gm. of sand were used in each tube)

No formation of humus or any organic matter was observed in the course of five times repeated tests of the tubes containing pure sand (A), nor with four times repeated tests of the tubes

containing pure sand plus mineral fertilizer (B). Only in one case with the B filling, 0.025% organic matter was measured at the end of the test. Since this system contained no organic matter at the beginning, and microlife can grow only from microlife, it is thought that in this case contamination occurred, either through



air-borne organisms or while filling the tube. In all other cases, C through G, varying amounts of organic matter were produced in addition to the original content of the added preparations or compost. The photograph on the preceding page shows very distinctly the formation of black-brown humus in the different tubes of one of the test series.

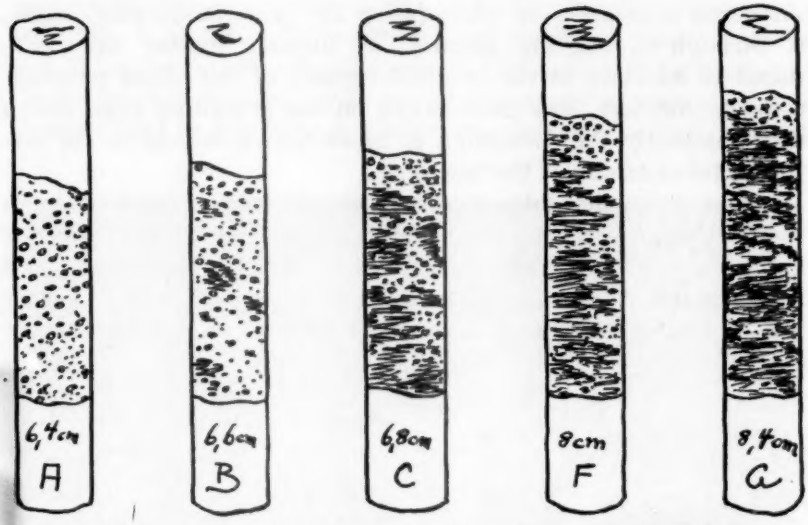
The following table presents the findings in reference to the formation of organic matter. It shows the concentration of humus at the beginning and conclusion of the experiment, and the increase of organic matter over that present in the various fillings at the start, as well as the number of tests made in each case.

Filling	Kind of Filling	No. of Tests Made	% Organic Matter at Start	% Organic Matter at End	Increase Over Start = Times the Original
A	50 gm. pure sand	5	zero	zero	zero
B	50 gm. sand plus 0.01 gm. 6-10-4	4	zero	zero	zero
C	50 gm. sand plus 1 gm. b.d. compost	5	0.308	0.338	1.098
D	50 gm. sand plus 0.1 gm. No. 500	1	0.0348	0.120	3.448
E	50 gm. sand plus 1 gm. 502-6, 2 drops 507	2	0.0678	0.725	10.61
F	50 gm. sand plus 2 gm. 502-6, 3 drops 507	3	0.1356	0.366	2.699
G	50 gm. sand plus 1 gm. 502-7, 0.1 gm. No. 500	5	0.1026	0.732	7.135

Since each test required about six weeks, a considerable length of time was spent on these experiments. In fact, all four seasons were covered, but under laboratory conditions, at room temperature, no typical seasonal fluctuations were observed. However, it was observed that the dark coloring, typical of the organic matter, developed more on the side of the tubes exposed to light than on the opposite side where they were mounted against a wall. More stratification was also evident on the light-exposed side, while on the reverse side the coloring was more uniform.

The drawing on page 6, of the 4th series of experiments, illustrates the increase in volume and porosity which was obtained with the development of organic matter. At the end of the test, the lengths of the various columns of material were not the same, because the ingredients of the different tubes did not settle uniformly.

The designating letters (A, B, C, F, and G), which appear on this drawing, correspond to those indicating the various fillings as given in all the tables in this article. While filling G did not result in the maximum increase of organic matter, it did produce the largest volume and the best structure.



Of the water-soluble humus extractions, the optical transmission of light of the wave length l=450 was determined with a Coleman Spectrophotometer, using a PC-4 filter. The wave length 450 was selected because here a clearly defined point in the absorption spectrum was found. The absorption curve was plotted against distilled water by calibrating the instrument so that distilled water gave 100% optical transmission. Each reading was repeated several times and agreed within a few points of the first decimal. The higher humus content of a solution resulted in a lower percentage of optical transmission, as you will see in the next table, which gives our findings for this experiment. It may be mentioned in passing that the laboratory has worked out a spectographic method for testing neutral, alkaline, and acid humus solutions, using the percentage of optical transmission as a means of determining the humus content of a given solution. (Discussion of the method, as such, will be presented at another time.) This method, by the way, could also be used to investigate humus losses in the runoff from fields, in irrigation waters, erosion waters, and soil solutions draining into the subsoil. In the present experiment, the figures were as follows:

Filling	Kind of Filling	Average Optical Transmission in %	No. of Tests Made
A	Pure sand	99.4	5
B	Sand plus 0.01 gm. fertilizer 6-10-4	99.1	5
C	Sand plus 1 gm. compost	88.5	4
D	Sand plus 0.1 gm. No. 500	83.0	2
E	Sand plus 1 gm. Nos. 502-7	60.2	2
F	Sand plus 2 gm. Nos. 502-7	87.5	3
G	Sand plus 1 gm. Nos. 502-7 0.1 gm. No. 500	70.9	5

It is our understanding that not all organic matter is present in the form of humus, and that only a fraction of this humus is extractable with water. This latter amount is measured spectrographically. We are fully conscious of the fact that humus determination methods exist using, for instance, the acid or alkali soluble fraction. In this case, however, we were interested in the amount of water-soluble humus produced.

The findings demonstrate that the highest amount of water-soluble humus was produced with the addition of the *smaller* amount of the bio-dynamic preparations 502-7. This parallels the interesting observation that the higher amount of organic matter was also produced with the smaller amount of said preparations. This bears out the fact that the preparations are something entirely different from mere compost. Compost is rotted organic matter in general, and acts by reason of the *quantity* which is applied. The bio-dynamic preparations contain a small amount of 'compost', but their importance lies in their dynamic, stimulating effect. They also contain micro-organisms. These, in turn, multiply, excited by the dynamic effect of the preparations, and create more organic, living substance and humus than compost alone could do. That the smaller amount accomplishes more than the larger amount is *one* expression of the *dynamic* effect.

The preparation No. 500 does not produce as much organic matter (compost) as do the others. But it enhances the effect of the others. Thus it seems necessary to use both the 502-7 and the 500; the first, to produce the organic matter, the second, to stabilize the effect.

As far as the task is concerned which was set for these experiments, it can be stated that even pure, sterile sand can be enlivened again. It *is* possible. The amounts of organic matter produced in our experiment may seem small, but it should be emphasized that they were produced in the brief time of 4 to 6 weeks and without the help of crop residues, roots, etc. The related question as to whether this can be done under practical farm conditions cannot be answered on the basis of the experiments described here. In farming, general economic conditions, climate, cultivation practices, and water supply, all have to be considered. Field observations, and practical, large-scale tests have to come into the picture. We may add that our own experience has shown that it is possible for the farmer to reclaim completely run-down soil or sand. However, he can accomplish

this only if there is enough rainfall or water for irrigation, and if at the same time there is at hand an amount of compost and manure sufficient for the initial step of reclamation. By "sufficient" manure and compost we mean 10 to 20 tons per acre of composted material with a 50 to 60% moisture content. This application is for a green manuring and cover crop. For succeeding crops these amounts can be reduced to those generally used in farming. In this way even desert soils can be reclaimed. Unless there is the initial step of an extra dose of organic matter at the beginning, however, the pace of the reclamation will be too slow to be economically feasible.

DR. PFEIFFER'S LABORATORY REPORT

Readers of *BIO-DYNAMICS* who are interested in hearing about the research work of Dr. Pfeiffer are invited to send for the Annual Report just issued by the Biochemical Research Laboratory, Threefold Farm, Spring Valley, N. Y. A postcard to this address will bring you a copy. Readers who are also members of the B.D. Association will already have received their copies.

THICK IS THE ICE ON GRINDSTONE

STERLING W. EDWARDS

Two Gardens. This family has put to vote—and vote carried—the proposition that we shall need in future 2 large gardens instead of one. Our canned things and our stored things give out by Spring. We need more to carry us further along into radish and onion time. In the past we have bought some field corn, wheat and rye. We should be raising our own. For this purpose we have kept a 1½ acre field across the creek in legumes for 3 years. This area has 3½ feet of topsoil on much of it. And we have 3 large compost piles to go on it come Spring.

Ice, Store Stuff and Country Schools. Snow covers our hills and mountains here; temperatures are from 0 to 20; Grindstone Run is solid-over-frozen in certain places; chickadees, woodpeckers, cardinals, titmice, Carolina wrens and an occasional junco spend time on the suet and the bird feeder; rabbit signs are everywhere. The winter diet of many of our people is mainly hog meat, potatoes and white bread off the baker truck. One family back along the mountain uses 60 bushels of potatoes per winter. The white, thin faces of the children attest to the lack of vitamins. Visit a country school at noon or at dismissal as children pour down the steps. What you read in their undernourished faces will no doubt engender fears concerning the health of the coming generation. The present one, undernourished on store stuff and the orthodox nutrition of 20 years ago, is being rejected as unfit in roughly 35% of cases, country boys in higher percentage than their city cousins. Does this augur well for our future, the fact that our chief enemy is devoted to black bread, sunflower seed and other basic foods while our fighting men have been reared on hot dogs, white rubber bread and the contents of the tin can?

English Mill. We have again become interested in an English flour mill in view of the present favorable rate of exchange, and air mail letters are being exchanged. The maker wants to ship us four in a box without electric motors; keeps the unit cost down. This little mill sits on a table or in a kitchen cabinet. Would be nice to hear from any B-D enthusiast interested in one of the four. At present the four cost $154.00 plus 15% Customs, plus freight to Port of Baltimore, plus probably some

further freight or express and some taxes maybe. Meantime we are getting more facts and closer figures. Any B-D person with experience of this mill would confer a favor by writing us. (See Bio-Dynamics, Spring 1947, Vol. V, No. 2, p 18.)

Do You Buy Much Fruit? Where does it come from and how is it raised? Most people haven't the faintest idea of the spraying, the fertilizing and the packing procedures that fruit goes through before it lands on display counters. Here is a notice from the commercial orchardist's supply house, listing the chemicals offered for the 1951 spray program, chiefly for the common tree fruits: 7 trade-name sprays (sulfur mixes) : dusts of sulfur, copper, pyrethrum and rotenone; spray of sulfur, DDT and lead; copper dust; spreaders and stickers to make sprays cover and glue on; nicotine with other dusts; DDT in various percentages; summer oil spray; arsenate of lead. Do you know anything of the toxic qualities of these chemicals inside you through eating food contaminated with them? Much about such toxicities is in the record. Read *Bio-Dynamics,* Spring 1949, pp 23-29. Be sure you understand the meaning of "translocation."

Your own fruit trees, and the soil under them, may be thus dosed with the above poisons if you follow the recommended orthodox program; or the ones almost forced on you by the radio, the newspapers and magazines and the state agricultural departments. And, in most cases, if you take the unorthodox way of no chemicals, you won't have any fruit. For three years now, the Jap beetles have cleaned off our heavy peach crop.

Do You Tell Your Friends About Whole Wheat Bread From B-D Wheat? And, also, tell them about other basics in the diet such as unsulfured figs, dates, raisins, prunes and apricots; and good vegetables grown on compost; blackstrap molasses, raw sugar, wheat germ, brewers yeast, yogurt and the various seeds? Do you? Or did you, and getting no response, stop telling anybody anything? Of all our relatives, friends and acquaintances only 4 sets of such are interested; the rest seem to prefer getting most of it at the store, "it's so much less bother, you see."

People seem to think its a reflection on their private and heaven-conferred right to follow the radio ads, if in contradiction you mention the general worthlessness and high price of much of the manufactured stuff that today gets put up in prissy

packages with prizes for the kids. I saw such an one today—the package of corn flakes offered "6 comic books inside." Thus stands the state of American Nutrition in 1951, middle of February. Are many people concerned about improving this low level?

The State Of Things. The greatest nation on earth, measured on its own terms, gets ready to send its 18 year olds off to fight its wars. What a mess to be in for a nation of our supposed dignity! At the same time, certain articulate critics of the allopaths continue to protest at the millions of dollars we pour annually into a number of medical sink-holes. As for results of this vast inpouring, the other healing arts ask "What have you found out so far?" The research boys seem to have nothing to offer except the same old double-talk. Into this picture then, the 18-year-olds must be fitted on return, if-and-when. Or will the rest of us come awake and bring about some drastic changes in the standpat orthodoxy of medicine and agriculture?

A small research laboratory on a farm at Spring Valley, New York, could use $50,000 annually and advance the cause of agriculture, health-giving food and healthy animals beyond all measure. It has already done so much so far on so little. Five wealthy people could give this amount and cut their income tax proportionately. Why haven't we more people who see the need for underwriting such projects? A radio commentator went out in a large city to tap the sources of worry on the part of a representative list of Americans engaged in a multitude of pursuits. He wanted to learn if the public was in a dither over our gummed-up international situation. To his surprise, he found that it wasn't—each individual was only worried about personal problems. Those with deep spiritual roots may not have personal problems.

Seeds. The catalogs are here and we plan to stay with the staple vegetables this year. We are not snowed in, but travel is thin and the air is quiet and the days are slow and peaceful and cold in these mountains. We have done a lot of back reading in our collection *of Bio-Dynamics* from the beginning. It is surprising how much we forget and how interesting and inspiring to read through number after number. Seed catalog time each year would be a good time to read through the last 4 numbers, picking up again all the side notes and references one made.

Perhaps Only A Little Food Is Needed. In various sources both current and historical we have found frequently the admonition to be wary as to HOW MUCH one eats as well as WHAT one eats. It appears indisputable, that until one studies one's appetite, one cannot know just how little food is really required. England was a relatively healthy nation through World War II, in spite of strict rationing, which we over here said was just enough to squeeze by on. Less food but all of it of organic origin, with more care taken in its assembly would pay handsomely in better general health, we think. And more time, too, for reading and contemplation of things of the spirit will give us prolonged peace and contentment.

IS IT EASY TO REMOVE DDT SPRAY RESIDUE FROM APPLES?

From a paper by Kenneth C. Walker (Washington State College, Pullman, Wash.) which appeared in Jour. Agric. Res. 78(10): 1949.

Apple samples with anywhere from 5 to 22.3 parts per million of DDT residue still clinging to them were washed in these tests. When the original DDT residue was more than 10 parts per million, standard methods of washing did not seem to be enough to bring the residue down to the tolerance level or less. Twenty-four hours of overhead sprinkling irrigation did not remove significant amounts of DDT residue from fruits sprayed with wettable DDT and petroleum oil, wettable DDT and dry casein-type-spreader or wettable DDT and liquid-soap-type-spreader.

YOU CAN'T BLAME THE VENETIANS

Material quoted and condensed from a paper by E. Schillinger which appeared in Forstwiss. Centralbl. 68(9): 1949.

It seems that the denuded condition of the Karst (Yugoslavia, Trieste) has been blamed on the Venetians for quite a few years. However, historical evidence recently brought to light shows that the Venetian shipbuilders, at the peak of their power knew how necessary it was to protect their timber stock with forest laws. During the decline of the Venetian Republic, toward the end of the 18th Century, excessive cutting and pasturing began. Reforestation was only started during the second half of the 19th Century.

HERB TEAS

EVELYN SPEIDEN

In places where living has become a fine art, there seems to be the greatest appreciation of the delicate fragrances, colors and flavors of a variety of herb teas. The tea ceremony of Japan expresses the peak of fine human relationships, yet long before its time the Chinese were experts at tea making, blending and enjoyment. The herb teas, or tisanes as the French say, are not to be thought of in the same category with the usual strong brews of coffee, cocoa and tea. These have their place, but often too large a place. If you know you "should not drink so much coffee," perhaps tisanes can offer you a new kind of pleasure, the sense-quickened memory of summer flowers while you sit by the fire and watch the snowflakes fall outside.

The tiny, daisy-like flowers of *chamomile* make the best known tea. Use the German chamomile (Chamomilla officinalis or Matricaria Chamomilla) not the English Anthemis nobilis. There are wild plants easily confused with true chamomile, but once you know the real chamomile fragrance, you will never mistake another. Also the chamomile is hollow in its central, yellow cone when cut vertically down the middle, while the false blossoms are solid. You can easily have your own chamomile patch, which will disappear every summer after blooming, but seed itself and come up stronger with the fall rains. It requires full sun and protection from other stronger-growing plants, as its seeds and first leaves are very tiny. Pick the blossoms when they first open, in the morning as soon as the dew is off, and dry in an airy, darkened place. If you pick the little bushes clean of blossoms every sunny morning, you will get better quality flowers; but let some go to seed at the end of the season.

For tea make sure your water is boiling well, then remove kettle from fire, drop in your flowers and re-cover quickly. Your lid should be tight enough to hold in steam. Or boiling water may be poured over the herb into an already heated vessel. Do not make it too strong, perhaps fifteen flowers for a cup of tea until you find out your own tastes. Let it steep five or ten minutes or until strong enough. Some say this tea should never be sweetened. In any case use only a bit of honey. All herb teas are delicate and easily spoiled by too much sweetening. Such unboiled tea, called an infusion, is used for flower teas and most of those made from leaves, whereas root teas are usually

made by decoction, or boiling, to bring out the essential oils. Whether we make an infusion or a decoction is of vital importance. If a plant which quickly releases its oils is boiled, away goes the flavor and you will decide, "I don't think much of that kind of tea." What is more, we know now that the vitamin content of teas, which may be considerable, is also dependent on seemingly small details. Some vitamins are destroyed by combination with oxygen, others by light or by boiling. Witness the Chinese covered teacup from which one drinks by tipping it slightly and gently sucking out the hot liquid from under the cover. The best tea is made right in the cup too, not poured from one container to another. Here are both light and air protection, as steam fills the space under the cover. Without knowing of vitamins, they somehow found what made the best tea. So if you have a nice pyrex teapot, better cover it with an English tea cosy, and keep a tight lid on any vessel in which you make tea.

Blossoms of the elder bush, the linden tree (sometimes called lime), of yarrow, borage, clover, lavender—all have been recommended. To my way of thinking, however, no flower tea equals that from the tiny, white blossoms of the sloe or blackthorn bush (Prunus spinosa). Being so small, they are slow picking and dry to almost nothing, but the spicy aroma that rises when they unfold again on the surface of the tea is worth the effort. The Chinese are fond of adding one or another flower to a cup of green tea—fragrant jasmine buds, small chrysanthemums, little red rosebuds; but these are kept dried and separate from the tea until the moment of brewing. Next door to my home in China stood a little shop which prepared and sold tea roses. The old-fashioned, sweet, red buds were picked early on the morning they would bloom, pressed open a little and dried in single layers on huge wicker trays over charcoal fires. For a magic time each spring the whole countryside was transformed by the odor of roses.

Most teas are made from the leafy parts of plants, a long list of them beginning with Thea sinensis, the tea of every grocery store. Several varieties of Thea are grown, mainly in the Far East, but the difference between black and green tea is due to the treatment of the leaves after picking. Try the more delicate green tea if you do not know it well, but don't expect it to look dark like black tea. It is naturally pale in color even when quite strong—and one can easily get it too strong.

Most leaves of the mint family make good tisanes—spearmint, applemint, orangemint, horsemint, pennyroyal, rosemary, sage, thyme, catnip, ground ivy, lemon balm, hyssop, basil, horehound, marjoram and most of all, peppermint. Some of these you'll like much better than others and even the same plant may vary amazingly according to its growing conditions. For example, peppermint grown near stinging nettle (also good as tea) will have up to two and one half times as much essential oil. My peppermint plants were moved recently to a raw and unfavorable location. The plants show this by their growth and it takes nearly half a handful of leaves to make a strong enough cup of tea. Meanwhile a friend has sent some grown in Ohio on a Bio-Dynamic place of some years standing. I was astonished to find that a couple of the little dried tips are ample for the same amount of tea.

Pick all these leaves on a sunny morning as soon as the dew is gone and preferably just as the flower buds are swelling, often including the flowering tip as well, for then the plant has its strongest scent and flavor. Spread out thinly to dry in a well-ventilated and preferably darkened place, *never* in sun. They should keep a good green color. However—California to Florida take notice—dried leaves are generally used only because they keep better through seasons when fresh ones are not available. After we've used dried mints all winter, the fresh, spring shoots from the garden make a tea that is startlingly different—and so much better! One exception to this is the Equisetum arvense, horsetail or scouring rush, the plant used for our Bio-Dynamic Spray 508. As a medicinal tea helpful in kidney ailments, it is not likely to be taken for pleasure, yet it is interesting to note that its green parts are good only after being dried, and must be boiled to make the tea.

Other medicinal teas are made from feverfew, boneset, mugwort, beebalm, mullein, vervain, angelica, coltsfoot, wormwood, hops, wintergreen, celery and many others,—but don't ask me to tell you what they are supposed to cure, for that is not my line. As many of these are bitter and unattractive, one is not likely to experiment with them for pleasure. However, it is well to remember that almost all herb teas have been used medicinally in past ages. Such properties are still present whether or not we happen to know of them. For this reason no one of these teas should be taken habitually unless on a doctor's orders. Enjoy many of them and do not confine your

interests to one or two. Other leaf teas you may like to try are the leafy and flower tips of agrimony, costmary, lemon verbena, sweet woodruff, goldenrod, lovage and speedwell, also birch, blackberry, strawberry and raspberry leaves.

Among the seeds liked for teas are fennel, anise, caraway and coriander. One of the most nourishing of teas is made from the seeds of roses in the rose hips, gathered when they are red in the fall. I have found them mildly good but did not suspect what Miss Davis says in her cook book, reviewed in this issue, that they contain such an intense concentration of vitamin C as to put orange juice far in the shade. She recommends they be preserved and used as an all year diet. Addition of a little lemon juice not only improves the flavor but helps prevent vitamin loss. This would be true of many other teas as well, so that where lemon or other citrus juice can be added with enjoyment, the acid is beneficial.

Root teas include parsley root and dandelion root, the latter being a first cousin to the chicory roots substituted for coffee. The well-known root beer and ginger ale are basically herb tea combinations from roots, which are more easily handled commercially than fragile plant parts and need boiling to bring out flavor. Sassafras root is a main ingredient of root beer and makes a delicious tea by itself, often used as a spring tonic in the south. It is fun to dig your own roots. Sassafras is a widely distributed native tree, related to the avocado and the sweet bay. You can recognize its spicy smell and its three kinds of leaves, one oval and entire, one three-lobed and the third mitten-shaped, that is with a lobe on only one side. Mulberry is the only other tree you might meet having varying leaves but they also have a scalloped-toothed edge. In digging sassafras select small trees a foot or so high and follow the stem into the ground as far as you can go before breaking it. Cut off any fine roots and wash the main roots quickly but thoroughly, being careful not to damage the bark where the flavor lies. Cut into convenient pieces and dry for storage. With large roots you can take off the bark as it dries. It makes a tea of clear, lively, golden tan, distinctive in color, after ten to twenty minutes of boiling.

One root which you cannot dig yourself (unless you live in the tropics) is ginger. Fresh ginger root is available in Chinatowns, or dried from a pharmacy, the former preferred. Keep fresh root refrigerated until you use it. You can make

your own crystallized ginger and have the thick syrup left for adding "gingerly" as sweetening to various teas and fruit juices. It's much better than ginger ale for many things. With Chinese green tea especially, it is a taste thrill. Incidentally while you have the fresh ginger on hand, try a piece about small hazelnut size, well minced and cooked with pork dishes. Ginger is another item the Chinese use frequently in cooking and with highly commendable results. The powdered stuff you buy in tins won't do.

All these teas from single herbs are only the beginning. From them you get acquainted with flavors and gradually learn to make your own combinations. Here are just a few suggestions.

Lemon, lime or orange juice when flavor suits; not good with mints.

A leaf of rose geranium.

If you can get citrus fruit raised without poison sprays, save the peel. That little potato and carrot scraping gadget easily takes off the outer peel thinly and with very little of the white backing. Dry this and drop in a few pieces with many kinds of tea. Especially good with the Maté or Paraguay tea.

A couple of whole cloves.

Chamomile, peppermint and yarrow in the proportions of about 2:2:1.

A little lemon balm in peppermint or many others.

Try some iced for summer, although the Chinese say a hot drink is the most cooling thing in torrid weather.

A sprig of the curly mint (used in the mint juleps of the south) in cool drinks.

Never add milk, cream or sugar. If sweetening is desired take a little, mild-flavored honey.

With some teas you might like a bit of blackstrap molasses (which is amazingly high in its mineral content) or maple syrup, —but go easy.

Occasionally, as with sage tea, a tiny pinch of salt improves.

To show how far herb mixtures can go, here is one of a number of delightful herb teas that used to be served for supper at Ter Linde, a Bio-Dynamic farm in Holland:

Use dried and well mixed—

caraway seeds (ground)	1 part
thyme (leaves and blossom tips)	1.8 parts
yarrow flowers	5 parts

fennel (whole leafy top) ..... 5 parts
peppermint ..... 5 parts
strawberry leaves ..... 3.5 parts
blackberry leaves .....15.5 parts

All this does not begin to exhaust the possibilities for pleasure if you start exploring in an experimental frame of mind—only be very sure you know the plant you are cooking. Many of our common weeds and garden plants are safe enough to handle but poison to eat.

Here are some books to help you:

Manual of Cultivated Plants L. H. Bailey Macmillan
Gray's New Manual of Botany (This and above are scientific books, but fundamental)
Any and all herb books
Edible Wild Plants Oliver Perry Medsger Macmillan
Poisonous Plants of the United States
Walter Conrad Muenscher Macmillan
Weeds Walter Conrad Muenscher Macmillan
Edible Wild Plants of Eastern North America-Fernald & Kinsey
Idlewild Press

THE GREEKS HAD THIS TOO

Material quoted and condensed from a paper by A. Georgopulos which appeared in Jour. Forest. Suisse. 101(1): 1950

From a study of the works of Theophrastos the writer concludes that the ancient Greeks knew a great deal about the science of forestry and its special branches, such as dendrology, plant physiology, silviculture, forest utilization and forest protection of certain forests and trees in the densely populated coastal areas where most of the original forests had already disappeared.

EAT YOGURT AND LIVE LONGER?

From a report by Ralph Crosman in Food in Canada. 10(4): 1950.

Yogurt as a major part of the diet is thought to be responsible for increased longevity of humans in the Balkans . . . Cultured milk products are gaining favor in the United States. They are extremely digestible; more than 90% is digested within one hour as compared with the several hours required to digest ordinary milk.

A GOOD RECIPE FOR MILK

WALTER VANDERBEEK

The author, a working farmer already familiar to readers of this quarterly, here writes a kind of "farmers' supplement" to an interesting pamphlet "The Truth About Pasteurized Milk," *by C. P. Bryant, M.D. Dr. Bryant concluded, among other things, that "What we must have for our children is pure milk, which can come only from healthy cows." And his paper, published by the National Nutrition League, Inc., Box A-442, 905 Third Avenue, Seattle 4, Washington, ends with the words: "WHAT WE NEED IS NOT THE ELIMINATION OF RAW MILK, BUT THE ELIMINATION OF SICK COWS!"*

Mr. VanderBeek, in hearty agreement with the doctor, goes on into the problems of the farmer in eliminating disease.

* * *

More and more, dairymen are endangered by diminishing insight into the fact that the health and resistance of their cattle are related to the fertility of the soil, the kind of plants grown in it, and the way the farm is managed.

Western Europe, once one of the best milk-producing areas, is still producing milk, but the herds are diseased in such a way that the American Occupation Troops in Western Germany refused to buy the milk Holland could ship to them unless it could be labelled: "Coming from T.B.-free herds." The Dutch farmers could not meet those standards and lost important trade. Brucellosis, T.B., and foot-and-mouth disease have wiped out entire herds. And yet T.B., for instance, is on the increase. Reactors were sent to the slaughterhouse, with the aim of obtaining a certified herd, but it was found that the remaining animals were still highly susceptible to tuberculosis, because they were lacking the natural immunity. So also, the technician considers foot-and-mouth disease as a virus disease; he prepares his vaccine, which gives an artificial immunity, and the cow is safe for six months.

But the biologist dreams of a natural immunity, which develops by way of a special feeding program.

The cow should not only eat "grass"—consisting of *a large variety of grasses*—but also the *"weeds,"* such as dandelion, buttercups, wild buckwheat, etc. etc., *and the leaves of trees* surrounding the pasture. This builds long-term immunity,

drawing conservation of health out of the living soil via a rich and varied plant mixture.

Such biological immunity of the cattle has almost entirely disappeared in the Netherlands. Yet seen from a biological standpoint the combatting of disease can never be effective when no attention is paid to the predisposition of the animal. This predisposition to health or disease can be partly of inherited origin, but it is also connected with management practices, the feeding program and the care the animals get. The old farmers consider it nonsense to kill the animals reacting positively to the T.B. test, and they maintain that putting them on a pasture with a real, live soil will cure them entirely.

In Holland, the trouble started with the extensive use of chemical fertilizers. Thus, for instance, too much nitrogen on grass gives an abundant volume, but brings about a lower percentage of the important minerals and vitamins, thus producing an unbalanced food, both for animal and man.

Furthermore, research shows that with chemical fertilizing the humus content of the soil diminishes, it loses its crumbly structure and the soil life declines. It is this soil life which feeds the plant indirectly. Therefore a harmonious supplying of the plant is now no longer possible. The living bridges between soil and plant have fallen apart, and the resistance against diseases has also declined through the decrease in the biological value of the soil and plant. Careful investigations show that all the biological shortcomings of the plant are transmitted to animal and man, and often in a very short time.

Laurence Easterbrook said it in his way when he wrote for the *London News Chronicle:* "It was a mechanical conception that took the line that so many tons of nitrogen, phosphate and potash were taken out, therefore so many tons must be put back again. It did not go quite so far that if iron deficiency were suspected you threw in a bag of nails, but it was along those lines. Many farmers refused to play. Those poor foolish men refused to believe that every animal was the same and that its digestion and metabolism responded in exactly the same way to a given type of ration. Yet it is on these twin theories, worked out over a century ago by men in laboratories with test tube mentalities, that much of agricultural teaching rests. Surely a slender foundation for an industry on which our health and life depends."

It is remarkable that Nature refuses to fit itself into such an incomplete and artificial picture: animal diseases are now costing hundreds of millions annually and we are constantly being baffled by new diseases, in animals and plants, which we seem to be unable to eradicate.

In the October, 1948 issue of *Organic Gardening* there was a thought-provoking article from the hand of an authority on organic farming, Dr. Ehrenfried E. Pfeiffer. You may have read it, but this part cannot be read too often:

"Then there is the case of milk. Modern sanitation is of course essential in the cowbarn as in the handling of milk. Dangerous bacteria should be removed through pasteurization. But does this solve the problem? True, pasteurized milk does not contain living intestinal bacteria, coli and others, but their dead bodies are still there. The farmer is required to produce a milk with a bacteria count of less than 50,000. However in the case of transportation this count may increase to 200,000 or even as high as 1 to 3 million. Well, what of it, we think, pasteurization will take care of that. The dead bodies of bacteria, however, contain just as much poison as any other dead organism and may reduce the 'Health' value of the milk. And what do we care about a milk rich in minerals, calcium, phosphate, trace elements, etc.? Do we ever bother our heads about those problems? Production methods and feeding programs have quite a bearing on the value of milk, not merely on the butterfat content and bacteria count which are the only criteria by which the farmer is paid. The quality of a soil and the feed grown upon it already determine the quality of milk. Let us ask our scientists to give us data on the health and nutritive value of farm products founded on the quality of soils. Then one day the time may come when a milk is produced that will keep well, maintain a low bacteria count, and not need to be pasteurized, thus securing the highest value."

We quote from "The Merck Report" for July, 1949, written by the eminent authority Dr. Albrecht, a.o.; "Summing up, the authors conclude that 'varied nutritional deficiencies, including trace minerals, may be the common cause of multiple symptoms, including the presence of these particular microbes (which in this case cause brucellosis). This was shown by the fact that foods containing trace elements led to prompt recovery. Their studies indicate that trace minerals, and not bacterial agents, are the determining factors in the causation of a large number

of diseases whose cause is obscure. Harmful bacteria commence to thrive, and corresponding disease symptoms start to appear, only when there is a marked deficiency of trace minerals, which deficiency provides the underlying cause of many diseases—in animals and in human beings as well as in plants.'"

Most of the experiments on trace elements have been done with chemical salts. These, however, when given in too large amounts, are potentially toxic. We would like to see long term experiments carried out using additions of powdered rock, for instance rock phosphate, and glauconite to provide any needed potassium. These to be given directly to the soil. They are ground very finely and are for the main part readily available for the plants. They are by no means injurious, do not wash out of the soil, leave no poisonous residue of sulphuric acid, but stimulate the soil life, the abundance of which is the only source of health for the plant. Those rock phosphates and other ground rock fertilizers also contain the most important trace minerals, as for instance silica, iron, sodium, chromium, fluorine, strontium, titanium, manganese, boron, copper, nickel and lead, in a well-balanced form. Another way to add the needed trace minerals to the cycle of the soil, plant, animal, and the foods produced by the animals, is to mix *very* small amounts of these in their salt form with our composts or our composted manures before these are spread on the fields.

What it finally comes down to is that the farmer has to develop insight, both in regard to his soils and in connection with his cattle. So, with his cows, he must learn to observe the individual animal and see how far he can go without causing trouble.

At the *optimum* production level one will not only have a cow which is reasonably healthy, but one of good breeding quality.

The careful cattle breeder will have two types of animals in his herd. The high production type, and the breeding type of 'improved average level' will both be present.

The goal is reached in several steps. The first step is to improve the maintenance level and then to see what else can be done so as *not to force* the high production level right away. THE COWS WHICH SHOW THE HIGHEST PRODUCTION AT MAINTENANCE LEVEL WILL BE THE BASIS FOR THE FUTURE STRAIN OF CATTLE.

On his farm, Dr. Pfeiffer made an interesting observation in connection with pastures and grain rations: (There are pastures of all types on his place—poor, average, improved.) When the cows were put out on the improved pastures they increased in milk production, and a stage was reached when they didn't even look at their grain when they were brought in for milking and feeding in the barn. They had sufficient in the pasture. Pasture and hay field improvements are fundamental for all cattle feeding. Means for this improvement are subsoiling, reseeding with grass and clovers, dressing with 5 to 8 tons of well-rotted manure per acre.

It was Dr. Pfeiffer's experience that by not overdoing grain and protein, a healthy herd can be kept without mastitis and breeding trouble.

What we can do on our own farm is to *plan a sound pasture program.* Permanent pastures should usually be the basis of this. Properly established with suitable legumes and grasses on good soil, and properly fertilized and efficiently managed, they will provide earlier grazing in the spring and later grazing in the fall, as well as more abundant grazing throughout the season.

Good pasture planning and management will—

1. Insure abundant succulent forage for the herd throughout the entire season.
2. Provide natural, palatable and nutritious feed for the milking herd at all times.
3. Save labor and harvest costs in feed production and reduce the need for high-priced purchased feeds.

Temporary pasture crops such as Sudan grass, sweet clover, pearl millet, soy beans, etc., can be seeded in spring or early summer to provide grazing after the permanent pastures begin to fail.

Early-cut meadows, if fertilized when the hay is removed, will form a good late-summer or fall pasture.

Do not ever overgraze a pasture. Weeds get a start in that way, and the value of the pasture declines rapidly. Scatter the animal droppings in the old field every time after the cows have been turned into a new pasture. Also clip the pasture after each rotation. Trials by the Bureau of Dairy Industry at its Lewisburg, Tenn., field station, showed that frequent clipping increased the net returns from permanent pastures by $15 an acre.

Rotational grazing not only increases the carrying capacity of a pasture but is essential for the maintenance of stands of clovers and other legumes in the pasture mixture.

Irrigation, whenever possible, is of course ideal, however more fertilizer is needed then.

Every farm should have a liquid manure tank. The product should be applied in a well-fermented form attained by the use of the Bio-Dynamic preparations, and be spread on a cloudy and quiet day. Try to spread it just before the rain.

Much more could be added, but in following the few basic suggestions given, the basis for a healthy herd is laid. And healthy herds, in turn, offer the only possibility for obtaining milk, safe to drink, for our population.

ORGANIC MATTER BOOSTS CROP PRODUCTION

From the California Farmer, 1/27/51

The periodic addition of organic matter helps keep cultivated soils at a high level of productivity.

It is a common observation that increases in yield following the application of organic matter are often greater than can be accounted for by the food elements which the organic matter contains.

Wayne Weeks, Extension Service agronomist, explains that organic matter improves the physical condition of the soil by making it more friable, and facilitates water penetration. In a rapid process of decay, it exerts a strong influence on the physical condition of the soil. Organic matter also often increases the available plant nutrients in the soil.

It can be added to the land through crop residues, by applying manures or composts, or by the use of cover crops. Barnyard manures and other organic manures, while important, are not adequate in supply for the extensive areas where organic matter is needed. For much of our farm lands, cover crops offer the only practical means of supplying the organic matter in the quantity required to keep the soil in proper physical condition, or at a high state of productivity.

SOME OBSERVATIONS ON FEEDING, HEALTH AND PRODUCTION OF DAIRY COWS

R. G. SCHONBECK

Some of the experiences we have had in our dairy during the past two winters seem worth passing on to others. It is for this reason that I am anxious to put them down on paper.

We run a dairy of about 30 cows as nearly as possible along Bio-Dynamic lines. During summer—as is the custom on almost all dairy farms—the cows graze on pasture and are fed twice daily (at milking time) a grain ration according to their individual production. During winter we usually feed hay 3 times a day, grain as in the summer, and also (at milking time) our own corn silage.

During the summer of 1949 we suffered from a severe drought in this area. Our upland cornfields were without rain from planting time until maturity. We were, consequently, severely short on silage. In order to supplement our own feed we bought government surplus potatoes, which were offered at the price of the transportation plus one cent per hundred pounds. We fed from 800 to 1,000 pounds per day to about 30 cows.

These potatoes had been grown—according to reports from drivers of the trucks, and some of the growers themselves—on sandy soil, using up to 2,000 pounds per acre of commercial fertilizer of a 5-10-5 or even heavier analysis. We used a handful of these in the house, just as a trial, and found them practically "inedible" as compared with our home-grown potatoes. (This latter only as a side remark.)

The cows relished the potatoes, and they seemed, at the time, to be a life-saver—pulling us out of a serious situation caused by the drought. Here are the facts and figures as to how the animals reacted:

Our production per month for about 18-22 cows milking, was around 20-22,000 pounds. Be it noted "for the record" that we had a slight feeling, even at the time, that some of our cows were actually giving too much milk for their own good.

Now to the other side of the picture: From October 1949 through March 1950, our cows freshening during that period did not produce a single calf which lived over 3 days. Several calves were in the wrong position at birth, others died from white scours in spite of the disinfecting of stalls. There were a lot of retained afterbirths requiring veterinary attention, and

these in turn helped aggravate the breeding problem. Never—to my knowledge—before on this farm during its B.D. management had breeding been a problem; we had had a first service conception rate of about 90%. But during this particular winter 7 cows failed to settle on time, and the loss in milk figured out to nearly 20,000 pounds—or one whole month's production lost for the year. We had three severe cases of acetonemia requiring glucose injections by a veterinarian. We had eight cases of udder trouble requiring treatment. Our veterinary bills, in other words, were a major item on the deficit side, coupled with the loss of the calves themselves.

During the past summer of 1950 we had good growing weather. Although some of our hay got a severe dose of rain, our silo was full to bursting with bio-dynamically grown corn silage. There was thus no need this fall and winter to buy potatoes or other supplementary feed. Our silage should last well toward the end of April.

Our monthly production figure runs around 18-19,000 pounds for 18-20 cows. However, it should be added that the fat runs 3.7-3.8%, as compared with 3.4-3.5% last winter.

We have had no dead or sick calves to date, no retained afterbirths. So far there was only one slight case of lack of appetite. Also, all cows are being bred on schedule or so nearly on schedule that there will be no appreciable loss in milk thus far, and udder troubles are nearly non-existent.

I have no intention of passing any judgments or expressing opinions on the above statements, too many factors influence production and health of cows. But all those factors which can be controlled were identical in both of the periods mentioned: the same personnel did the milking and feeding, grain rations were identical, and we fed hay in the same quantities. The only difference was: surplus potatoes in 49/50 as against Bio-Dynamic corn silage in 50/51. A lot of the above data can easily be translated into dollars and cents, but as these figures will vary with the locality and other conditions, such calculation is left up to the interested reader.

BOOK REVIEW

LET'S COOK IT RIGHT. *By* ADELLE DAVIS. 626 pp. New York Harcourt Brace & Co.—$3.00.

A new cook book can be more intriguing than a new novel—and this is one of that kind. Several friends had recommended it and when I finally laid hands on a copy, it turned out to be just what I had been wishing for, food preparation based on the best scientific knowledge, aimed at planning and cooking primarily for health.

Miss Davis agrees with the Bio-Dynamic belief that good flavor, texture and color are indicative of high nutritive value. To preserve all of these, cooking cannot be a haphazard process, but is governed by definite principles which are easily learned and are here explained clearly—and interestingly. Quick washing of fruits and vegetables is advocated to preserve soluble vitamins lost by even brief soaking. Destructive enzyme action is prevented, and vitamins conserved, by quick cooking of fresh foods, by cooking at lower than boiling temperatures and in closely covered utensils which shut out light and keep in steam, thus allowing for use of very little water.

The chapter on bread-making aided considerably my efforts to use the whole grain flours—and it is difficult to find sources of help along this line. The author believes, as we do too, that yeast is preferable as a leavening agent to baking powder because of the destructive effect of soda on B vitamins, and so she gives many yeast recipes. Some suggestions for simplified canning, for pickling and particularly for the frequent use of fruits and of vegetable and fruit juices, agree with my experience—which is always satisfying in a new book.

On the other hand, the recommended use again and again of various supplementary processed foods because of their high mineral content, is superfluous for those who are able to live largely on rightly-grown, natural foods. For city dwellers with no backyard vegetable garden, however, they are valuable and certainly much better than synthetic materials.

A kitchen should first be equipped for health, then organized for efficiency—suggestions for this are given. Attention is paid to simplifying menus and procedures, to saving pots and pans, to one-dish meals, to new and unusual foods of high nutritive value, to encouraging good food habits in children as well as adults. Simple, health-building foods usually are suit-

able for young and old alike, so that preparation time for special items is saved.

Salads and soups provide ample chance to use the products of the herb garden. Much space is given to meat cookery so as to waste none of the dollars spent for this expensive food, and to meat substitutes which may save dollars without sacrificing nutriment. An unusually large number of recipes for cooking vegetables are a help to one who grows his own and is anxious to conserve the vitamins for which he has labored.

The Bio-Dynamic school, especially in this country, has so far been able to give far too little attention to food preparation. Unfortunately the best-grown food can very easily be spoiled between garden and table. This book will help greatly to give us knowledge we need to preserve the unusual food values we get by right soil treatment and growing methods.

Miss Davis is a subscriber to Bio-Dynamics, as I discovered after finding her book, and she attended the most recent Bio-Dynamic Conference of the West Coast Branch of the Association in California, where she lives. We hope the rumor is true that she is planning another book to be called "Let's Grow It Right."

EVELYN SPEIDEN

TREES AS MEMBERS OF BIOLOGICAL COMMUNITIES

Material quoted and condensed from a paper by C. Malmstrom which appeared in a Swedish journal, Kungl. Lantbruksakad. Tidskr. 88(3): 1949.

The trees composing a forest stand are elements of biological communities, and the ecological conditions for any single tree are determined by the presence and activity of other individuals of the same and of different species. Forestry cannot be placed on a biological basis without a study of forest communities. (In other words, it is a good idea to try to find out how the different trees in a forest get along together or don't as the case may be. This sort of observation integrated with topography, water supply, and soil type will lead to a deeper understanding of why some reforested areas flourish and others languish and die.—ED. B.D.).

SOME NOTES ON GROWING GOOD SWEET CORN

R. G. SCHONBECK

In so many gardens that I see while passing by along the road, or visiting friends, I notice sweet corn that is either doing very poorly or not doing anything at all. The soil may be in very good shape and other vegetables doing fine, still the sweet corn is a flop.

During our nine years "on the farm" in various parts of the East, we have always had good sweet corn—both in flavor and quantity. Friends who have tried it seem to agree emphatically with us, as do the many people who have bought our surplus corn on and off. This all prompts us to jot down a few remarks on how we grow it.

The most important thing is to know the requirements for this plant. It needs plenty of room to grow and plenty of rotted manure or compost to feed on. It is a very heavy feeder, and it likes plenty of light and sunshine.

The best way to make sure it has both is to plant it in HILLS and enrich the hills individually with compost or manure. This way you know what you have, and you do not fertilize the weeds between the hills. Using hills makes for better cultivation, and will give you nicer corn than if grown in rows. The hills should be no closer than 30″ in the rows, and the rows of hills 36″ apart. Put a good double handful of manure or compost in each hill unless you have unusually fertile soil. Plant no less than 3 rows at a time to insure good pollination. The rows can be short, 4 or 6 hills per row is enough. Stay away from hedges, trees or shading fences, corn does not like competition for its food.

I usually take a hoe, hack small holes, put compost in them (or manure) cover lightly to keep the seed away from direct contact with the manure or compost, and then cover with about 1 to 1½ inches of dirt. Be sure to see that no stones are put on top of the seed. It weakens the shoot for it to have to find its way around stones, and sometimes discourages it entirely from coming up. Put 5 or 6 seeds in each hill. When the corn is well up, thin out to leave the 3 nicest stalks, 2 if your soil is not so good.

If well taken care of, each hill will produce from 3 to 6 nice big, fat ears, the number depending on soil and moisture available.

As to planting time, let me say that corn is a hot weather crop and does not like "wet feet." So don't plant until the nights are quite warm and the sun has plenty of strength. Stay away from poorly drained or wet spots. May 1st is about the earliest planting date near New York City. Planting too early often results in poor stands because the seed rots. Watch out! if you have a lot of crows or blackbirds in the neighborhood. They love to pull corn. Crow repellent is not exactly desirable, but it may be your only safe bet. Keep planting every 2 weeks or so until July 15th, and use an early-maturing variety for your last planting to make sure it ripens before frost comes.

There are a lot of good varieties and I am only mentioning those I have had experience with. The best in taste is open-pollinated Golden Bantam. But: 1.) It has small ears with only 8 rows of kernels (one of its trade-marks!) 2.) It won't stand much drought and 3.) It suffers easily from storms and high wind.

Its great advantage is that you can save the seed (not possible with hybrids) and even improve it—as we have done with our seed, now in its 5th generation bio-dynamically grown, and getting better each year. Our own strain is so perfect in germination that we need to plant only 3 kernels per hill to get 3 perfect stalks.

Good hybrids are Joana (yellow), Lincoln (yellow) and Snowcross or Stowell's Evergreen hybrid (white). Carmelcross is an excellent early yellow variety, but it bears ears so close to the ground that groundhog or skunk damage is invited. The antidotes to that are either a heavy dose of lime or, better, a 22 rifle and time to watch and wait for the evildoer; and best of all, is a good fence!

During a severe drought, mulching helps. If you do any watering, you have to soak each hill and keep on doing it all along. Corn needs moisture most when the ears are formed and are filling out. It is easy to tell when dryness is beginning to do damage. If you see the leaves of the corn plants curl or roll up in the heat of the day, it is time to do something. A good way is to soak the corn well, toward evening, and immediately cover with a thick mulch to hold the moisture in the ground.

Golden Cross Bantam—a popular variety—is a heavy yielder, but we have found its flavor decidedly inferior to the other varieties. You sacrifice quality for the sake of quantity—as is so often the case when dealing with nature.

Pick corn ears when the grain is filled out and in the milk stage—normally when the silk has turned dark and dry.

Golden Bantam remains in its prime for only a short period of time before turning starchy, the hybrids stay sweet longer.

As to pests, we have had very little trouble, and attribute this to B.D. practices. Jap beetles can be serious if they are numerous enough to eat all the silk before pollination can take place. They dislike white corn and are attracted by yellow. It helps against them to use lime on the silk. Better yet is to pick the beetles off repeatedly.

Here is hoping you have good luck this year with your corn, and all the rest of your garden as well!

AGRICULTURAL CONFERENCE

The annual agricultural conference of the Bio-Dynamic Farming and Gardening Association, Inc., will be held at Threefold Farm, Spring Valley, N. Y., August 30th-September 2nd inclusive. Readers interested in learning more about Bio-Dynamics in practical terms, are welcome whether or not they are members of the Association. It is possible to attend the sessions and commute by car from New York City. For rates and reservations at Threefold Farm, write to Mrs. Elizabeth Kroth.

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